



Article

# Statistical And Mathematical Analysis Of Economic Efficiency Indicators

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**Abstract:** This article examines methods for assessing the level of economic efficiency and approaches to analyzing them. The main focus is on determining the level of economic efficiency of construction industry enterprises. The article analyzes the problems encountered in identifying these levels and provides suggestions for addressing them. The system of indicators used in evaluating the economic condition of construction enterprises is examined, and practical methods for determining efficiency are substantiated. As a result, scientific and methodological recommendations are developed to serve in increasing the level of efficiency. Additionally, the possibilities of using information systems in assessing economic efficiency are explored. The research findings are of significant importance in developing strategies to enhance economic efficiency for enterprises operating in the construction industry.

**Keywords:** efficiency, enterprise, analysis, effectively, invested capital, return on equity, tax burden, leverage ratio, return of sales

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## 1. Introduction

When analyzing and quantitatively assessing the economic efficiency of construction materials industry enterprises in the Jizzakh region, it is necessary not only to analyze financial indicators, including profitability indicators, but also to assess the factors influencing their change using in-depth statistical and mathematical methods [1]. With the help of this approach, it is possible not only to determine the current situation, but also to identify the main factors determining economic efficiency. In addition, it is advisable to analyze other performance indicators of enterprises in the current industry, including changes in such indicators as labor productivity, capital productivity, and their impact on the results of economic activity. In this paragraph, data on the activities of "ZENATKOR TEMIR BETON BUYUMLARI" LLC, specializing in the production of reinforced concrete and finished concrete products, were taken as the object of analysis [2-4].

Analysis of the results of the activities of "ZENATKOR TEMIR BETON BUYUMLARI" LLC in 2020-2024 showed that the indicators of final financial results at this enterprise have significantly decreased over the past two years. In particular, in 2024, compared to 2020, the gross profit from product sales decreased by 2.9 times, profit from core activities - by 3.3 times, and net profit - by 2.0 times. This is primarily due to the fact that the company's net revenue from product sales decreased by 3.2 times during this period [5]. The volume of other income from the main activity of the enterprise was very small in 2020-2023, and in 2024 such income was not received at all [6]. No income was received from financial activities at all during the analyzed period. This means that the enterprise

receives income only from its main production activities [7]. The dynamics of the change in the volume of expenses of the enterprise occurred in proportion to the change in the volume of income [8]. The highest financial results of the enterprise's activities occurred in 2021-2022. In 2021, the company's net revenue from product sales reached 37,816,086.2 thousand soums, and its net profit reached 2,461,051.6 thousand soums, Table 1 [9].

## 2. Materials and Methods

In this study, a comprehensive approach was applied to assess the economic efficiency of construction industry enterprises. The research methodology consisted of the following stages [10]:

1. The concept of economic efficiency, assessment indicators, and existing scientific approaches were studied. At this stage, scientific works of domestic and foreign scholars were analyzed, and comparative analysis methods were employed.
2. Statistical and financial data on the activities of enterprises operating in the construction industry were gathered. Based on these, key indicators (such as profitability, efficiency, level of resource utilization, and others) were calculated.
3. A system of indicators crucial for assessing economic efficiency was formulated. Based on these indicators, the efficiency levels of enterprises were determined.
4. Statistical analysis, comparison, graphical analysis, and expert evaluation methods were utilized to determine the efficiency levels of enterprises. Additionally, the possibilities of real-time data processing based on information systems were explored.
5. Shortcomings identified during the assessment process were examined, and scientific-methodological recommendations for their elimination were developed.

Scientific perspectives on assessing economic efficiency have been shaped by years of experience and theoretical foundations. Notably, the works of Samarov and Saidov [11,12] establish practical approaches to developing economic analysis and evaluation indicators. Bakhromov [13] conducts an in-depth study of the criteria system for determining economic efficiency in the construction industry. In global practice, advanced developments in assessing economic efficiency based on digital information systems are examined in [14,15]. Through this literature, it is evident that the methods and recommendations presented in the article are scientifically grounded and hold practical significance.

## 3. Results and Discussion

Based on the above data, we have obtained the following results.

**Table 1.** Dynamics of the final financial results of "ZENATKOR TEMIR BETON BUYUMLARI" LLC, in thousand soums.

| Indicators                      | 2020         | 2021         | 2022         | 2023         | 2024        |
|---------------------------------|--------------|--------------|--------------|--------------|-------------|
| Net revenue from product sales  | 20,988,429.9 | 37,816,086.2 | 36,369,110.9 | 19,784,114.1 | 6585,488.9  |
| Profit from core business       | 2,717,881.5  | 4,031,206.3  | 8,761,428.0  | 310 428.6    | 816,686.9   |
| Gross profit from product sales | 2,876,403.3  | 6,179,152.3  | 9,227,868.3  | 4,182,333.2  | 977,107.6   |
| Net profit                      | 1,354,246.0  | 2,461,051.6  | 7,643,937.7  | 3,242,541.6  | 664,814.2   |
| Cost of goods sold              | 18,112,026.6 | 31,636,933.9 | 27,141,242.6 | 15,601,780.9 | 5,608,381.3 |

|                                   |           |             |           |           |           |
|-----------------------------------|-----------|-------------|-----------|-----------|-----------|
| Operating expenses                | 478,693.6 | 3,249,307.2 | 513,097.8 | 639,742.7 | 160.420.7 |
| Expenses for financial activities | 344,256.2 | 203,324.7   | 73,718.1  | 38,264.3  | 34,552.5  |

The volume of assets and equity of ZENATKOR TEMIR BETON BUYUMLARI LLC in 2020-2024, unlike the dynamics of financial results, had very high growth trends. In particular, the total assets of the enterprise for this period increased 2.1 times, the volume of current assets - 3.3 times, and the volume of equity - 2.7 times. The volume of fixed and borrowed capital also had an average annual growth trend of 7.1% and 1.9%, respectively, in the analyzed period. In the context of a growing trend in the volume of assets and capital of the enterprise, a decrease in financial results indicates a decrease in the efficiency of existing assets and capital. For a more accurate assessment of this, it is necessary to analyze profitability indicators [16-18].

Analysis of the dynamics of profitability indicators for the enterprise's assets and capital showed that the profitability of the total assets of "ZENATKOR JEMIR BETON BUYUMLARI" LLC increased in 2020-2022. This was influenced by the high financial results of the enterprise during this period. In 2023-2024, profitability indicators decreased in the context of a decrease in financial results. In particular, the profitability of the company's total assets increased from 10.6% to 40.2% in 2020-2022 and decreased to 2.4% by 2024. Also, the profitability indicators of fixed assets and current assets increased from 37.0% and 25.0% to 79.6% and 95.8% in 2020-2022, respectively, and decreased by 8.5% and 3.7% until 2024. The indicators of the profitability of borrowed and equity capital of the enterprise also had the same dynamics as the indicators of return on assets. The indicators of the return on borrowed and equity capital increased from 31.4% and 16.0% to 200.1% and 50.4% in 2020-2022, respectively, and decreased to 14.3% and 2.9% by 2024, see Table 2.

**Table 2.** Dynamics of indicators of return on assets and capital of ZENATKOR JEMIR BETON BUYUMLARI LLC, in %.

| Indicators/ year           | 2020 | 2021 | 2022  | 2023 | 2024 |
|----------------------------|------|------|-------|------|------|
| Total return on assets     | 10.6 | 17.7 | 40.2  | 20.6 | 2.4  |
| Return on fixed assets     | 37.0 | 40.2 | 79.6  | 3.2  | 8.5  |
| Return on current assets   | 25.0 | 63.2 | 95.8  | 20.6 | 3.7  |
| Return on equity           | 16.0 | 24.5 | 50.4  | 15.6 | 2.9  |
| Return on borrowed capital | 31.4 | 63.5 | 200.1 | 70.5 | 14.3 |

In general, among the indicators analyzed above, the return on fixed capital is above the risk level, while the return on borrowed capital indicator remains at the normal level. It can be seen that other indicators have fallen to dangerous levels.

Analysis of profitability indicators for income and expenses of the enterprise showed that although the dynamics of changes in these indicators, as well as indicators of return on assets and capital, increased until 2022 and decreased again until 2024, the volatility of changes is not very high, and almost all indicators remained at a high level compared to 2020. In particular, the profitability of total income increased from 6.4% in 2020 to 21.0% in 2022 and amounted to 10.1% in 2024. Only the profitability of core activities in 2024 is 12.4%, which is slightly less than 12.8% in 2020, see Table 3.

**Table 3.** Dynamics of indicators of return on assets and capital of ZENATKOR JEMIR BETON BUYUMLARI LLC, in %.

| Indicators/ year                            | 2020  | 2021 | 2022   | 2023  | 2024  |
|---------------------------------------------|-------|------|--------|-------|-------|
| Rentability of total income                 | 6.4   | 6.3  | 21.0   | 16.1  | 10.1  |
| Profitability of revenue from product sales | 13.7  | 16.3 | 25.4   | 21.1  | 14.8  |
| Profitability of core business              | 12.8  | 10.4 | 24.1   | 1.5   | 12.4  |
| Return on Total Expenses                    | 6.8   | 6.8  | 26.6   | 19.2  | 11.2  |
| Profitability of production costs           | 7.5   | 7.8  | 28.2   | 20.8  | 11.9  |
| Return on operating expenses                | 282.9 | 75.7 | 1489.8 | 506.9 | 414.4 |

In general, such fluctuations in the narrow interval of profitability indicators analyzed in Table 2.3.3 can be attributed to proportional changes in income and expenses at the enterprise.

Although profitability indicators at the enterprise have decreased in recent years, only the indicators of profitability of total income and profitability of sales revenue remain within the risk level. The profitability of production costs, although below the average level, remains above the risk level. While the profitability of core activities and the profitability of total expenses remained at the normative level, the profitability of operating expenses is several times higher than the normative level. Such a high level of profitability of operating expenses cannot be considered entirely positive. Because in the context of a decrease in the volume of product sales at the enterprise, it is necessary to implement an effective marketing policy against this and increase the necessary marketing expenses in this regard. At the enterprise, sales expenses were not incurred at all during the analyzed period. Very low and decreasing operating expenses lead to very high profitability of these expenses.

Another goal of analyzing the economic efficiency of enterprises is to assess to what extent and in what direction the factors influencing the change in the economic efficiency of the enterprise's activities, as well as to determine the possibilities of increasing the efficiency of enterprise assets, capital, income, and expenses. Therefore, the DuPont model, a multifactorial mathematical method of economic analysis, was used to quantitatively assess the influence of various factors on the profitability indicators of "ZENATKOR TEMIR BETON BUYUMLARI" LLC.

When analyzing the structure and dynamics of the enterprise's labor resources, it was established that the total number of employees of the enterprise increased from 75 to 80 people from 2020 to 2024, and more than 80% of them are production workers. During this period, the number of production personnel increased from 61 to 64 people, the number of service personnel increased from 6 to 8 people, while the number of management personnel remained unchanged (8 people), see Figure 1.

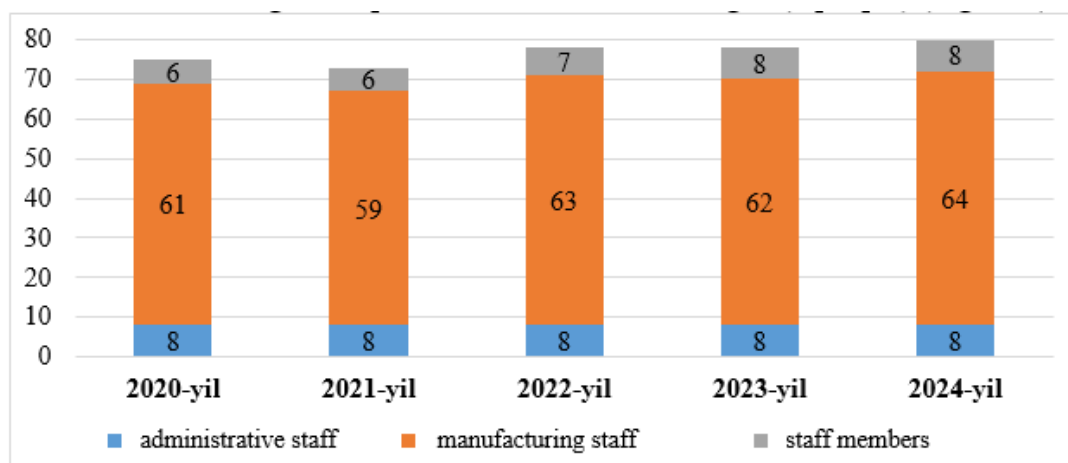


Figure 1. Composition and dynamics of labor resources of LLC "ZENATKOR TEMIR BETON BUYUMLARI"

The number of production personnel was taken for analysis as a factor directly influencing the product manufacturing process. The analysis of the dynamics of fixed capital volume in Table 1 above was also carried out. Therefore, based on the data in Table 4, we will analyze the efficiency of the enterprise's labor and capital resources.

**Table 4.** Dynamics of labor and capital resource efficiency indicators of ZENATKOR TEMIR BETON BUYUMLARI LLC.

| Indicators                                                   | 2020      | 2021      | 2022      | 2023      | 2024     |
|--------------------------------------------------------------|-----------|-----------|-----------|-----------|----------|
| Labor productivity, thousand sum/person                      | 344,072.6 | 640,950.6 | 577,287.5 | 319 098.6 | 102898.3 |
| <i>compared to last year, in %</i>                           | +24.4     | +86.3     | -9.9      | - 44.7    | -67.8    |
| Return on capital, in coefficients                           | 2.9       | 3.8       | 3.3       | 2.1       | 0.7      |
| <i>compared to last year, in %</i>                           | +17.0     | + 32.0    | -12.4     | -37.9     | -66.8    |
| Level of capital equipment of workers, thousand soums/person | 120,404.2 | 169,942.8 | 174,745.1 | 155555.3  | 151009.0 |
| <i>compared to last year, in %</i>                           | +6.3      | +41.1     | +2.8      | -11.0     | -2.9     |

From the analysis results presented in the table above, it can be seen that labor productivity at the enterprise in 2021-2022 was very high (640.950.6 thousand soums/person and 577,287.5 thousand soums/person, respectively). But by 2024, it sharply decreased to 102,898.3 thousand soums/person, which is 6.2 times less than in 2021. In terms of labor productivity, the enterprise achieved high growth rates in 2020-2021, including 86.3% in 2021. However, over the past three years, labor productivity has had a downward trend. In 2024, labor productivity decreased by 67.8% compared to the previous year.

Such trends as changes in labor productivity were also observed in the dynamics of changes in the capital return indicator, which represents capital efficiency. If in 2020 the enterprise produced an average of 2.9 soums of products per 1 soum of fixed capital, then in 2020 this indicator increased by 32.0% and amounted to 3.2 soums. Due to the high rate of decline in 2022-2024, the return on capital in the last year was 0.7, which is 66.8% less than in 2023 and 5.5 times less than in 2021. In general, under conditions of stable preservation of the number of labor resources and the volume of fixed capital at the enterprise, a sharp decrease in the volume of output led to a significant decrease in the efficiency of both resources.

The level of capital equipment of production personnel working at the enterprise is an important indicator determining the volume of labor productivity, its value at the enterprise increased from 120,404.2 thousand soums/person in 2020-2022 to 174,745.1 thousand soums/person, and in 2023-2024 it had a downward trend. However, this indicator, unlike the dynamics of labor and capital efficiency indicators, remained at a level 25.4% higher than in 2020 (151.009.0 thousand soums/person).

#### 4. Conclusion

Summarizing the above analysis, it can be said that the enterprise, in terms of labor productivity and capital return indicators, has not been able to utilize the large potential of production capabilities. If the enterprise returns to its capital return level in 2021, with capital equipment and the number of employees in 2024, it will be able to produce products worth 36,450,601.0 thousand soums, which is 5.5 times more than the actual production volume in 2024, and it will be able to restore 96.4% of the production volume in 2021.

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